The European Research Journal 2019;5(4):658-662 ORIGINAL ARTICLE

Clinical and functional outcomes of extracorporeal shock wave therapy in isolated medial epicondylitis

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DOI: 10.18621/eurj.448849

ABSTRACT

Objective: To evaluate the effectiveness of extracorporeal shock wave therapy (ESWT) for the patients with isolated medial epicondylitis refractory to other conservative methods.

Methods: A retrospective analysis of 57 patients with the diagnosis of isolated medial epicondylitis refractory to conservative measures was done. 36 of them who met our eligibility criteria were included. Patients were subjected to three sessions of extracorporeal shock wave therapy with 2000 pulses per a session in a dose of 0.06-0.12 mJ/mm2. Pain and clinical/functional scores were measured by visual analogue scale (VAS) and Quick-Disabilities of the Arm, Shoulder and Hand (Q-DASH) respectively before the treatment and at 1st week and 12th week of the last session.

Results: Mean age of the patients was 47.3 (25-67) years and there was a higher female presentation (24 female and 12 male patients). The VAS scores were improved from a mean of 7.8 before the treatment to 5.3 at 1st week ($p < 0.001$) and to 2.9 at 12th week ($p < 0.001$). Also the results of the Q-DASH showed a mean improvement from 50.4 before the treatment to 27.1 at 1st week ($p < 0.001$) and 9.6 at 12th week ($p < 0.001$). There were no significant differences in the improvements of VAS and Q-DASH scores by the time between the male and female patients.

Conclusion: According to the results of this study which will be one of the limited studies about isolated medial epicondylitis; ESWT is a good conservative treatment option for medial epicondylitis in refractory cases like in lateral epicondylitis.

Keywords: Medial epicondylitis, extracorporeal shock wave therapy, visual analogue scale, quick-disabilities of the arm shoulder and hand

Received: July 29, 2018; Accepted: August 19, 2018; Published Online: January 8, 2019

Medial epicondylitis with the other popular name "golfer's elbow" is common orthopedic problem. The prevalence is about 1% in population [1, 2]. With the result of repetitive micro-trauma over years to the common flexor origin of the humeral medial epicondyle, it typically occurs in the 4th-6th decades of life [3]. There are some treatment modalities for this condition including resting, physical therapy, non-steroidal anti-inflammatory drug (NSAID) usage, steroid injection, exercise therapy and orthosis. Although there are a lot of treatment options, the optimal treatment modality remains unclear [4, 5].

While initial conservative therapy and if failed open surgical management are the most popular treat-

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e-ISSN: 2149-3189

ment modalities; some of non-traditional methods like extracorporeal shock wave therapy (ESWT) have been used widely in orthopedic field. ESWT had been commonly used in the treatment of urolithiasis and choledocholithiasis. After the 1990's, it has been using for the common musculoskeletal disorders like plantar fasciitis and epicondylitis [6, 7]. Most of the previous studies were conducted to patients who failed to respond to conservative treatment modalities after the acute phase. Also the effectiveness of ESWT in the newly diagnosed lateral epicondylitis or medial epicondylitis was investigated in 2012 [8]. There are little studies showing the effectiveness of ESWT only in the management of medial epicondylitis.

This study aimed to evaluate the outcomes of ESWT in the treatment of isolated medial epicondylitis and to show its clinical and functional outcomes.

METHODS

The present study was designed as a retrospective observational study and was approved by ethics committee of our university with a number of 2018/64. A total of 57 patients were admitted to our outpatient clinics with the diagnosis of medial epicondylitis and treated with ESWT in the period between January 2010 and September 2017. The data of all of the patients were analyzed and the 36 patients who meet our criteria (patients with; unilateral and isolated medial epicondylitis, ESWT treatment was applied once in a week for three times and between the ages of 18-70) were included in our study. The exclusion criteria of the study were; presence of pregnancy, active infection or fracture around elbow joint, cervical radiculopathy, coagulopathy, upper extremity nerve entrapment syndrome, ipsilateral lateral epicondylitis or patients who were treated with local steroid injections, platelet rich plasma (PRP) etc. in 6 weeks of first ESWT application.

In all cases medial epicondylitis diagnosis were verified before the treatment by clinical tests, i.e. a painful local palpation at humeral medial epicondyle and positive "golfer's elbow test". Indications for ESWT involved persistence of pain and function impairment refractory to rest, ice, sling, pharmacological therapies (systemic and /or local non-steroidal anti-inflammatory drugs) or local steroid injections. All patients provided informed consent regarding that their medical records would be used in scientific studies.

Treatment

Treatments were performed using Swiss Dolorclast Master® ESWT machine (EMS Electro Medical Systems, Nyon, Switzerland), which produces radial shockwaves. Three sessions of radial ESWT (2000 pulses per a session in a dose of 0.06-0.12 mJ/mm^2) were administered weekly for three weeks in every patient.

Clinical Evaluation

Pain intensity and clinical/functional scores were measured by Visual Analogue Scale (VAS) and Quick-Disabilities of the Arm, Shoulder and Hand (Q-DASH) scoring systems respectively. The scoring records were subsequently obtained just before the treatment, at 1st week and at 12th week of the last session. VAS is a scale and is useful for measuring pain that is believed to range across a continuum of values and cannot easily be directly measured. The simplest VAS is a straight horizontal line of fixed length, usually 100 mm. The Q-DASH is an abbreviated version of the original DASH outcome measure. In comparison to the original 30 item DASH outcome measure, the Q-DASH only contains 11 items. It is a questionnaire that measures an individual's ability to complete tasks, absorb forces, and severity of symptoms. The Q-DASH tool uses a 5-point scale from which the patient can select an appropriate number corresponding to his/her severity and function level. Like the original version, the Q-DASH score ranges from 0 (no disability) to 100 (severest disability) [9, 10].

Statistical Analysis

One-way repeated measure of variance analysis was used in the analysis of the change of the time-dependent measurements. Two-way repeated measures of variance analysis was used to examine the variation of time-dependent measures relative to groups All analyses were performed with the Statistical Package for Social Sciences (SPSS) software ver. 22 (SPSS, Chicago, IL, USA). The *p*-values < 0.05 were considered statistically significant.

RESULTS

A total of 36 patients who met our eligibility criteria were included. There was a higher female presentation (24 females and 12 males). Mean age of the cohort was 47.3 (25-67) years. The affected extremity was right in 22 and left in 14 patients and the dominant arm was involved in 28 patients (77.7 %).

The VAS score was measured before the treatment, at 1st week and at 12th week of the last session of ESWT. A score from 0 to 10 was recorded. The VAS scores were improved from a mean of 7.8 (5-10) before the treatment to 5.3 (3-8) at 1st week ($p < 0.001$) and to 2.9 (1-7) at 12th week ($p < 0.001$). The changes of VAS score from 1st week to 12th week was also statistically significant ($p < 0.001$).

The Q-DASH score (0-100 points; 0 representing the best and 100 worst result) was also measured before the treatment, at 1st and at 12th weeks of the last session. The results showed a mean improvement from 50.4 (31.75-79.5) before the treatment to 27.1 (9-45.25) at 1st week ($p < 0.001$) and 9.6 (0-20.25) at 12th week ($p < 0.001$). There was also a statistically significant improvement of Q-DASH score values from 1st to 12th week ($p < 0.001$).

There were no statistically significant differences in the improvements of VAS and Q-DASH scores by the time between the male and female patients ($p = 0.682$ and $p = 0.693$ respectively).

There was a statistically significant proportional relationship between VAS and Q-DASH scores at before the treatment, 1st and 12th weeks (Table 1).

DISCUSSION

Medial epicondylitis is a painful, chronic and frequent clinical condition and there are a lot of treatment modalities but no one is the gold standard [11]. It involves degeneration of the flexor-pronator muscle groups of the forearm. Most of the patients having medial epicondylitis are not professional athletes but it has been associated with golfers, throwing athletes and workers requiring repetitive wrist flexion [12, 13]. There are less studies showing evidence for the treatment of medial epicondylitis and most of the knowledge comes from studies on lateral epicondylitis, this should be because of the reduced incidence of medial epicondylitis compared to lateral epicondylitis [14]. Conservative management is the basis of initial treatment for most of the cases as for other tendinopathies and consists of stopping activities causing symptoms, topically or oral NSAIDs and ice application. Injection therapies (steroid etc.) should be considered if these simple measures fail [1, 13, 15]. When the initial conservative treatment modalities and injection therapies fail to manage the problem, other conservative measures like ESWT should be considered. The positive effects of repeated application of shockwave therapy for the treatment of various musculoskeletal conditions like tendinitis,

Table1. The relationship between VAS Q-DASH scores BT, at 1st and 12th weeks

		Q-DASH-BT	Q-DASH-1st week	Q-DASH-12th week
VAS-BT	Pearson Correlation	.804	.484	.223
	Sig. (2-tailed)	**< 0.001**	**0.003**	0.191
	N	36	36	36
VAS-1st week	Pearson Correlation	.650	.585	.488
	Sig. (2-tailed)	**< 0.001**	**< 0.001**	**0.003**
	N	36	36	36
VAS-12th week	Pearson Correlation	.467	.410	.442
	Sig. (2-tailed)	**0.004**	**0.013**	**0.007**
	N	36	36	36

BT = before the treatment, N = number of the patients, Q-DASH = Quick-Disabilities of the Arm, Shoulder and Hand, VAS = visual analogue scale

fasciitis or calcified lesions had been reported [16]. ESWT converts electrical currents into shockwaves and delivers them onto target structures and has been using for the common musculoskeletal disorders like plantar fasciitis and epicondylitis since 1990's [7, 17]. We used low energy shock wave in this study according to the definition of energy dose established by Speed [7] in 2004; here, 0.12 mJ/mm^2 is a cut of value and above doses was defined as high energy shock wave and below doses was as low energy shock wave. Rompe *et al*. [18] and Oh *et al*. [19] reported that responses of tendon to shockwaves are dependent on energy dose and high energy shock wave therapy is more effective in treatment. However local anesthesia might be required when a high energy delivered because of severe pain and also higher energy doses above 0.60 mJ/mm^2 could cause necrosis of tendon [18]. Pettrone and McCall [20] in 2005 reported satisfactory clinical results from the delivery of 2000 low energy shock waves with a one week interval for three times totally in patients with chronic lateral epicondylitis and this therapy regimen was also used for newly diagnosed medial epicondylitis and lateral epicondylitis in a study by Lee *et al*. [8] in 2012. In this present study three sessions of radial ESWT (2000 pulses per a session in a dose of 0.06-0.12 mJ/mm^2) were administered weekly for three weeks in every patient and local anesthesia is never used.

Some minor complications have been discussed in the literature with limited reports associated with ESWT treatment like subdermal hematoma,local reddening and ecchymosis and they are considered as negligible [21, 22]. There is only one study reporting a case having ulnar neuropathy after ESWT application for medial epicondylitis in which the patient was operated for ulnar neuropath and his symptoms did not resolved totally [23]. We did not encounter any complications in our patients in this present study.

There are various reports on the use of ESWT in epicondylitis management with inconclusive results and most of them are about lateral epicondylitis [6, 24-27].

Limitations

This study is a non-controlled retrospective study on a limited patient group and patients' demographic features are variable. However despite of the fact, our study is a single center work on a series of patients with homogenous diagnosis, treated with a standard protocol and evaluated with a considerable follow-up time. The patients' mean VAS score results were 7.8 at just before the treatment protocol and reduced to 2.9 at the last control. Likewise the Q-DASH scores were 50.4 at the beginning of treatment and reduced to 9.6 at the lost follow-up. This shows nearly all of the patients are satisfied with this therapy regimen.

CONCLUSION

This work is one of the limited studies in the literature discussing about isolated medial epicondylitis and showed good clinical and functional outcomes. Like in lateral epicondylitis, ESWT is a good conservative treatment option for medial epicondylitis in refractory cases.

Authors Contributions

YT = Study design, Acquisition of data, Analysis and interpretation of data, and Drafting of manuscript. MA = Study design, Acquisition of data, and Critical revision. ZOK = Critical revision, Analysis and interpretation of data.

Conflict of interest

The authors disclosed no conflict of interest during the preparation or publication of this manuscript.

Financing

The authors disclosed that they did not receive any grant during conduction or writing of this study.

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